South Australia deX Project
Final Knowledge Sharing Report

Prepared by Energeia for **GreenSync** and
the **South Australian Government**

GreenSync ENERGEIA

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Glossary of Key Terms

Name	Description
Aggregator	An organisation that brings energy consumers or their consumer energy resources (CER) together into a portfolio to operate the CER as a fleet (note: retailers can be aggregators)
Application Programming Interface (API)	A set of clearly defined methods of communication between various software components
Consumer Energy Resources (CER)	Decentralised energy sources that individual consumers or small-scale entities can deploy, including rooftop solar, battery storage systems, electric vehicle charging devices, and controlled loads
CER owner	The legal owner of the CER
Dispatch	The act of engaging a seller to provide the contracted energy service at a scheduled time
Distribution System Operator (DSO)	The entity that is responsible for ensuring network security and reliability
Distribution Network Services Providers (DNSPs)	Electricity distribution businesses
Energy Services Company (ESCo)	A business providing energy solutions, including energy-saving technologies, energy-efficiency programs, internet-connected CER; an entity that can act as a buyer or a seller on deX
Frequency Control Ancillary Services (FCAS)	Used by the system operator to maintain frequency on the electrical system within prescribed standards (also termed 'ancillary services' in other markets)
Installer	An entity that installs CER at a site
Platform	Digital platform enabling the creation and publication of offers from aggregators/retailers to CER owners, and offers from SA Power Network (SAPN) and Australian Energy Market Operator (AEMO) to aggregators/retailers via digital contract hosting
Retailer	Responsible for buying electricity in the market, selling energy to consumers of all sizes, and managing the billing process; legally, each meter has a nominated 'Financially Responsible Market Participant' retailer
Virtual Power Plant (VPP)	Involves software-enabled, connected CER (e.g., HVAC systems, machinery, battery storage, generators) that are aggregated to behave like a power plant and that can be operated and monitored from a central point and coordinated to respond dynamically to market signals

Executive Summary

Background

South Australia (SA) has been a world leader in the uptake of rooftop solar photovoltaic (PV) systems, driven by high electricity prices, substantial government incentives, and favourable climatic conditions.[1] The state's journey with solar PV began in earnest in the mid-2000s, with rapid growth particularly from the late 2000s onward. This surge was significantly supported by the feed-in tariffs introduced by the South Australian government. These tariffs offered generous returns on solar-generated electricity fed back into the grid.

However, unmanaged solar PV can pose several challenges to an electricity system, primarily affecting grid stability and voltage levels. Given SA's rapid uptake of solar PV, unmanaged solar PV started to become problematic by 2020.[2]

As part of the South Australia State Government's approach to proactively address the impacts of high penetration of rooftop solar PV, the South Australia Demand Management Trials Program (the Program) was announced in 2018. The Program used demand response and consumer energy resource (CER)[3] management aimed to reduce energy costs for consumers by optimising the integration and use of customers' behind-the-meter (BTM) demand response and CER.[4]

GreenSync received this funding through the South Australian deX Project (the deX Project) to implement a digital marketplace enabling South Australian residential customers to find and accept offers from energy service providers that value the services of their CER. GreenSync submitted its deX Project funding application in 2018 and commenced the deX Project in early 2020. Data collection continued until April 2024.

The lessons learnt from pioneering trials like this project are vital to laying the foundations for the successful integration of high penetration of CER. They can be used to ensure that future projects' benefits are maximised and that the most cost-effective solutions are implemented to maintain grid stability. The South Australian Government therefore required completion of a series of knowledge-sharing activities, including this report.

Scope and Approach

GreenSync engaged Energeia to identify and document key lessons learnt from the deX Project with the aim to inform ongoing policy, regulatory, and industry development.

This report summarises how the deX Project improved the knowledge base to unlock the full potential of BTM CER at the state and national levels. It does so by focusing on the deX Project's key achievements in advancing the industry's understanding of establishing effective CER marketplaces, and implications for policy, regulation, and future government initiatives.

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[1] AEMO (2018), https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/SA_Advisory/2018/2018-South-Australian-Electricity-Report.pdf

[2] AEMO (2020), https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/SA_Advisory/2020/Minimum-Operational-Demand-Thresholds-in-South-Australia-Review

[3] CER in this context includes rooftop solar PV, behind-the-meter storage, and demand response resources.

[4] South Australia Demand Management Trials Program, 2018, https://www.energymining.sa.gov.au/__data/assets/pdf_file/0006/665349/181031_DM_Trials_Program_Guidelines.pdf

The South Australian deX Project

The deX Project constituted a world-first opportunity to establish a digital exchange to register CER, enable increased network hosting, and unlock customer value while supporting a resilient, affordable and customer-focused power system in South Australia.

The key objective of the deX Project was to implement a digital marketplace via an online portal to allow South Australian residential customers to find and accept offers from energy service providers that value the services available from their CER.

The deX Project achieved its goal by establishing a marketplace that enabled a registration process for eligible CER devices and allowed the owners to access energy services company (ESCo) offers relevant to their BTM resources. It also enabled ESCos to access de-identified information about the type, location and technical capability of registered CER,[5] to publish new offers based on specific CER characteristics, and with customer consent, to contact customers to promote offers.

The key achievements of the deX Project are therefore centred around the design, establishment, development, launch, and operational success of a world-first digital marketplace for CER in South Australia. This innovative digital marketplace yields significant value to the market operator, electricity networks, ESCos, CER owners, and consumers as a whole.

Table ES1 outlines the key project outcomes for these SA stakeholders.

Table ES1– Summary of deX Project Outcomes for Key SA Stakeholders

Stakeholder	Project Outcome
Customer	• Increased choice, avoiding service 'lock into deX though' • 'Virtual power plant (VPP) ready' to future-proof investment by customers in CER • Ability to receive incentives for grid services
Network Operators	• Increased visibility of CER connections • Streamlined CER network connection process • Support of DNSP reporting obligations for AEMO National CER Register
Retailers	• Reduced barriers to enrolling customers into a VPP • Reduced barriers to monetising VPP portfolio
Original Equipment Manufacturers	• Reduced barriers to accessing additional benefits using devices • Provided a platform for meeting jurisdictional requirements • Increased standardisation of jurisdictional technology requirements
Government	• Enabled 50,000-customer Home Battery Scheme program to be 'VPP ready' • Provided foundation for effectively managing CER integration • Unlocked grid and market service payments to consumers with CER

Source: GreenSync

[5] The specificity of this information was subject to legal advice regarding customer privacy and consents developed through the deX Project

Key Lessons Learnt and Implications for the Future

Numerous constructive lessons arose from the implementation of the deX Project, highlighting the importance of adaptive policies, enhanced training for installers, and technological improvements to support the evolving energy landscape in South Australia and other states.

Tailored Incentives for OEM Vendor Participation

The deX Project revealed the value of shifting incentives from a focus on platform registration of consumer devices to actively encouraging original equipment manufacturer (OEM) vendor participation. This recommendation aims to enhance the level and speed of technology integration and thereby marketplace efficiency.

Policymakers and industry regulators could foster OEM engagement through tailored incentives, ensuring that technical and operational integrations are seamless and beneficial for the broader energy market.

High Demand for Controllable Solar PV; Lower Uptake for Battery Storage

The adoption and enrolment rates for rooftop solar photovoltaic (PV) systems and behind-the-meter (BTM) battery storage units diverged significantly. Rooftop solar PV registrations were robust, whereas battery uptake was less than anticipated, primarily due to higher costs and technological barriers.

The energy sector must balance its support across solar PV, BTM batteries, and other flexible technologies, potentially by adjusting incentives or regulatory measures to encourage broader adoption of more valuable devices, including battery storage and electric vehicle charging solutions.

Installer Preference for Mobile Application Over Online Portals

Far more people used the mobile application rather than the online portal to register for the deX Project, highlighting users' preference for convenience and accessibility. That finding indicates that future digital strategies should focus on developing mobile-first solutions that simplify user interactions for installers as well as for consumers with CER, and that enhance the accessibility of energy management tools.

Need to Educate Installers on Emerging Compliance Requirements and VPP Opportunities for Customers

The operational stage revealed that the installers' awareness of new Smart Home compliance requirements and VPP opportunities varied greatly. While some installers were quick to understand and adapt to the new Smarter Home regulations, others remained largely uninformed.

This experience validates the need for policymakers and VPP operators to educate installers about emerging compliance standards and opportunities available for customers through VPPs.

Technology Integration Challenges

OEM vendors experienced varying degrees of success in integrating diverse technology platforms. The difficulties that some vendors encountered diminished the overall effectiveness and efficiency of the marketplace.

Continuous improvement in technical support and collaboration between a marketplace and OEM vendors is essential. More robust integration planning that anticipates and mitigates integration challenges is required.

Wi-Fi-Based Participation Challenges

Wi-Fi connectivity upon which the deX Project relied for real-time CER data transmission was intermittently unstable.

Policymakers should consider supporting more robust and reliable connection solutions, such as ethernet or cellular to remove the reliance on consumers' home internet connections. VPP operators and CER OEMs also should explore technologies that ensure consistent connectivity to improve data reliability and system performance.

Table of Contents

Table of Figures

Table of Tables

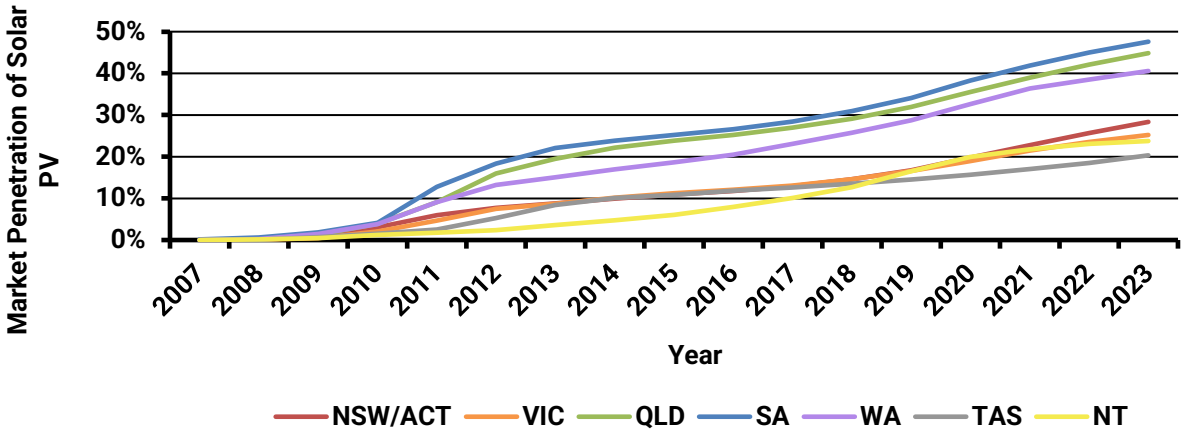
1. Background

1.1. Policy, Regulatory, and Industry Context at the Time

South Australia has been a world leader in the uptake of rooftop solar photovoltaic (PV) systems, driven by a combination of high electricity prices, substantial government incentives, and favourable climatic conditions.[6] The state's journey with solar PV began in earnest in the mid-2000s, with rapid growth particularly noted from the late 2000s onward. This surge was significantly supported by the feed-in tariffs that the South Australian government introduced. These tariffs offered generous returns on solar-generated electricity fed back into the grid.

Figure 1 shows that South Australia had one of the highest per capita rates of solar PV installations in the world by 2018, with solar PV installed in 31% of dwellings. Other Australian states also experienced growth in residential solar PV adoption due to similar national and state incentives, although with less penetration than that of South Australia, which had begun promoting it earlier.

Figure 1 – Historic Solar PV Market Penetration by State



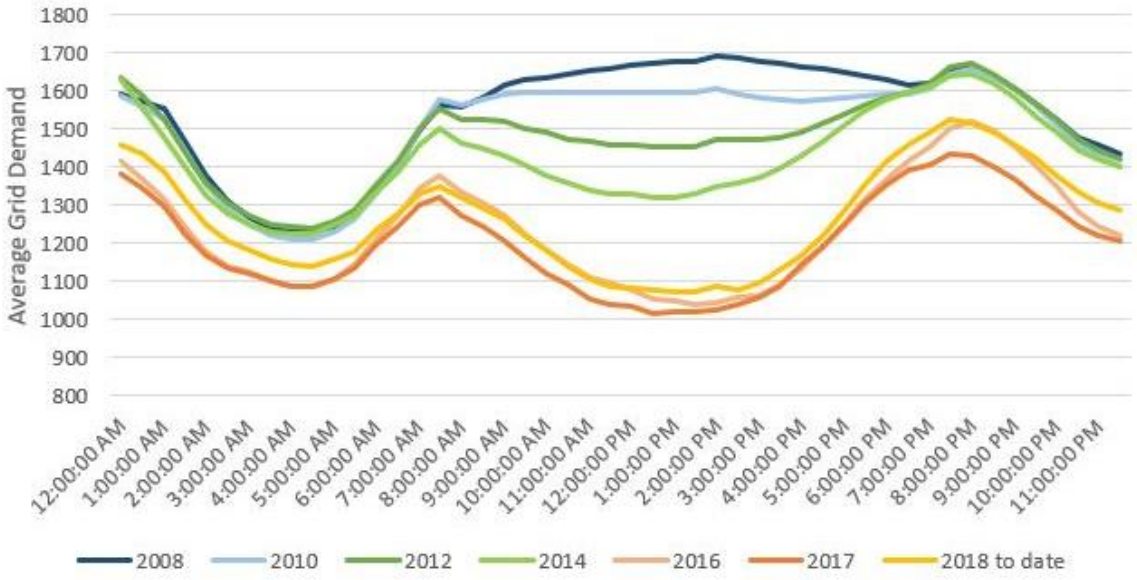
Sources: APVI, ABS, Energeia

Unmanaged CER can pose problems that affect the grid stability and cost of an energy system. For example, proper management, high penetration of solar PV can lead to voltage fluctuations, thermal overloads and cause generation to trip offline, particularly during periods of peak production or low demand, potentially disrupting service.

Analysis from AEMO, shown in Figure 2, demonstrates how solar PV uptake has influenced the demand profile for energy. The resultant demand profile shows falling minimum demand in the middle of the day over time. As minimum demand falls below the minimum load levels required by thermal generation to remain online, it threatens grid stability.

[6] AEMO (2018), https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/SA_Advisory/2018/2018-South-Australian-Electricity-Report.pdf

Figure 2 – Historic SA Average Grid Demand Profile in October



Source: AEMO (2018)[7]

The South Australian Government initiated the Demand Management Trials Program in 2018[8] driven by several key objectives aimed at enhancing the state's energy system security, reliability, and affordability. The program sought to integrate CER, including solar panels and batteries, into the grid more effectively. This integration was intended to resolve technological barriers and maximise CER benefits, such as reducing the need for expensive infrastructure upgrades and enhancing energy resilience. The trials would serve as a foundation for informing future policy and regulatory changes.

1.2. Current Policy, Regulatory, and Industry Context

The lessons learnt from pioneering trials like this project have played a vital role in laying the foundations for current policy and regulatory initiatives, ongoing industry research and development, and ultimately, the increasingly effective integration of CER into the South Australian and national energy system. They help to ensure CER benefits are maximised, and grid stability is cost-effectively maintained.

The Energy Security Board's (ESB) CER Implementation Plan[9] reflects increasing interest in unlocking the regulatory barriers that have hindered integration of CER into the energy system in Australia. Those impediments can be overcome by means of any of several actions:

- Implement flexible trading arrangements and reforms like the Scheduled Lite and Trader Services models to simplify market participation for smaller entities and consumers.
- Introduce new technical standards and governance for active CER devices to ensure interoperability and security across the system.
- Develop and implement emergency backstop measures and other regulatory reforms to reduce the risks associated with low system demand and high CER penetration.

[7] AEMO, 2018, https://aemo.com.au/newsroom/news-updates/minimum-demand-record-in-sa

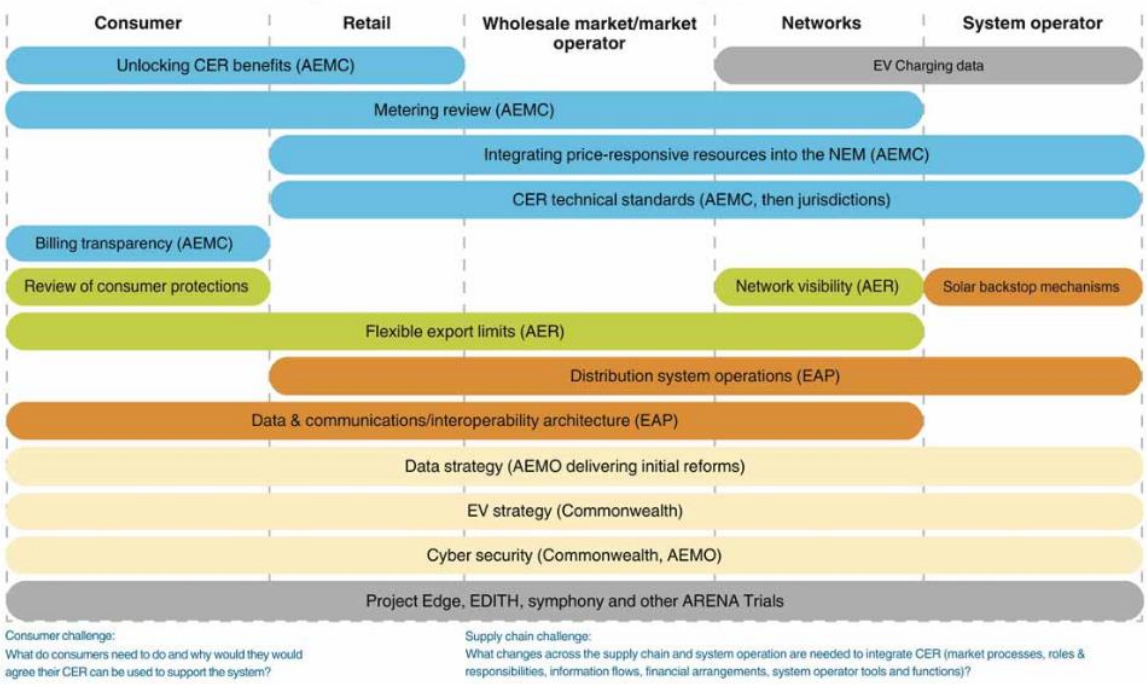
[8] South Australia Demand Management Trials Program, 2018, https://www.energymining.sa.gov.au/__data/assets/pdf_file/0006/665349/181031_DM_Trials_Program_Guidelines.pdf

[9] ESB (2021), https://www.datocms-assets.com/32572/1629954551-esb-final-report-explainer-clean-and-smart-power-der-pathway.pdf

- Progressively adapt consumer protections and market operations to support the evolving energy landscape, focusing on maintaining system security and optimising network utilisation.

Figure 3 summarises the draft of policy and regulatory reforms that have recently been explored.

Figure 3 – Summary of CER Implementation Plan Reforms Across the Supply Chain



Source: AEMC (2023)[10]

Appendix A contains more information on some of the key regulatory reforms and other Australian network initiatives.

SA Power Networks (SAPN) has implemented numerous other trials and programs building off the lessons learnt from this project, which aim to better aid the integration of CER onto their network, including:

- **Smart Hot Water Control**[11] – This controlled electric hot water project was developed to demonstrate active control over 2,400 residential hot water systems, 200 air conditioning control load adapters, and 200 pool pump control load adapters within South Australia.
- **Flexible Export for Solar PV**[12] – This new approach in integrating rooftop solar with the grid using smart inverters enables adjustment of the physical limit at which customers can export their power generation to the grid based on real-time supply-and-demand pressures. It began in 2020 with the participation of 600 customers in a field trial and is currently being rolled out to all new solar PV installations.

[10] AEMC (2023), https://www.aemc.gov.au/sites/default/files/2023-08/ERC0346%20CER%20Benefits%20Directions%20paper%20-%20rule%20change.pdf

[11] SAPN (2019), https://www.sapowernetworks.com.au/future-energy/projects-and-trials/smart-hot-water-control/

[12] SAPN (2020), https://www.sapowernetworks.com.au/future-energy/projects-and-trials/flexible-exports-for-solar-pv-trial/

- **Advanced Virtual Power Plant Grid Integration Trial**[13] –Tesla partnered with the SA Government in rolling out solar and battery systems to up to 50,000 customers and operating them as a VPP to deliver greater value for operators and customers from CER.

Other networks across Australia have also undertaken similar trials and programs.

Since the inception of the deX Project, other types of CER have risen to prominence across Australia, including South Australia. The emergence of technologies, such as electric vehicle (EV) charging and vehicle-to-grid (V2G), as well as demand response of consumer appliances present significant opportunities to mitigate the complexities of integrating solar PV into the energy system:

- EV charging can be managed to align with times of high renewable energy generation.
- V2G can play a crucial role in renewable energy integration by storing excess energy generated during peak production times, such as midday solar power, and releasing it during periods of high demand or low production, thus stabilising the grid and smoothing out the variability of renewable energy sources.
- Demand response programs incentivise consumers to adjust their energy usage based on grid needs, reducing peak load pressures and facilitating better integration of CER.

Together, these technologies provide valuable tools for balancing supply and demand, enhancing grid reliability, and supporting the broader adoption of renewable energy, ultimately leading to a more sustainable and resilient energy system.

As of April 2024, Energeia research found 18 commercial VPP offers available to South Australian consumers to maximise the potential of their CER, with the majority focused on battery and solar PV installations, and all building off the key lessons learnt from this project.

[13] SAPN (2020), https://www.sapowernetworks.com.au/future-energy/projects-and-trials/advanced-virtual-power-plant-grid-integration-trial/

2. Energeia's Scope and Approach

GreenSync commissioned a public report detailing the project's key lessons learnt. This report is aimed at capturing and analysing the outcomes and experiences gathered throughout the deX Project's lifecycle, identifying actionable insights and strategies that could inform future projects.

2.1. Scope

GreenSync assigned Energeia to identify and document the key lessons learnt from the deX Project in order to inform ongoing policy, regulatory, and industry development. This report summarises how the deX Project has contributed to knowledge about unlocking the full potential of demand management and distributed generation. It focuses on the key achievement of the deX Project: advancing the industry's understanding of how to establish and maintain a CER marketplace, and the implications for policy, regulation, and future government initiatives.

2.2. Approach

Energeia collaborated with GreenSync in achieving the key objectives and requirements of this supporting study for the deX Project.

The key project steps included:

- **Due Diligence** – Energeia reviewed the background materials that GreenSync and the SA Government supplied in order to understand the context and key findings of the deX Project, and consulted with the key project stakeholders from GreenSync and the SA Government regarding the key limitations, obstacles, opportunities and lessons learnt from the implementation of the deX Project. Energeia then supplemented these findings with a desktop review of historical policy, regulatory, and industry context and current policy, regulatory, and industry initiatives to which the key lessons from the deX Project would apply.
- **Documentation and Validation** – Energeia aligned its key messaging in the report with GreenSync and the SA Government via a results validation meeting, and then drafted this report based on the deX Project discovery work undertaken.

Energeia prepared this report in association with GreenSync.

3. The South Australia deX Project

The South Australia State Government launched the South Australia Demand Management Trials Program (the Program) in 2018 as a means of anticipating the potential impacts of the CER transition aimed to lower energy costs for consumers. The objective of the Program was to optimise integration and use of customers' demand response and CERs.[14]

The South Australian Government made funding commitments[14] for:

- Using demand response trials to demonstrate how consumers can benefit financially from changing their consumption patterns,
- Trialling demand aggregation to reward consumers for demand flexibility and reduce peak demand to reduce energy system costs, and
- Integrating distributed generation assets into the network to address challenges associated with this technology and to maximise the benefits it can provide.

GreenSync administered this funding through the deX Project to implement a digital marketplace enabling South Australian residential customers to find and accept offers from energy service providers that value the services of their CERs.

GreenSync submitted its deX Project funding application in 2018 and commenced the deX Project in early 2020.

3.1. Objectives

The deX Project presented a world-first opportunity to establish a digital exchange to register CER, enabling increased network hosting and configuration of a resilient, affordable and customer-focused power system in South Australia.

The deX Project had three main objectives and several secondary objectives:

- Establishing an easy process for registering CER assets, thereby benefiting consumers by
    - Creating a straightforward digital pathway for rebates on all eligible solar and storage inverters to lower costs for consumers and installers, thereby encouraging their participation in network support, wholesale, and FCAS opportunities
    - Assisting certified installers by digitally registering CER during installation, ensuring high-quality CER registration data
    - Establishing necessary functions and governance to manage consumer data, prioritising privacy, and security – crucial for preservation of consumer data rights
- Improving network and system visibility of customer assets to ensure that CER is an opportunity for SAPN and not seen as a risk or threat to network reliability via
    - Offering SAPN real-time visibility of registered CER to reduce the capital expenditure needed for increasing renewable penetration on the low-voltage network
    - Showing the ability to meet AEMO's CER Register and VPP Trial requirements
- Developing and showing future marketplace functions to offer more value to customers by
    - Enabling CER owners to participate in VPP and grid services opportunities, thereby strengthening the business case for customers to invest in renewable CER

[14] South Australia Demand Management Trials Program, 2018, https://www.energymining.sa.gov.au/__data/assets/pdf_file/0006/665349/181031_DM_Trials_Program_Guidelines.pdf

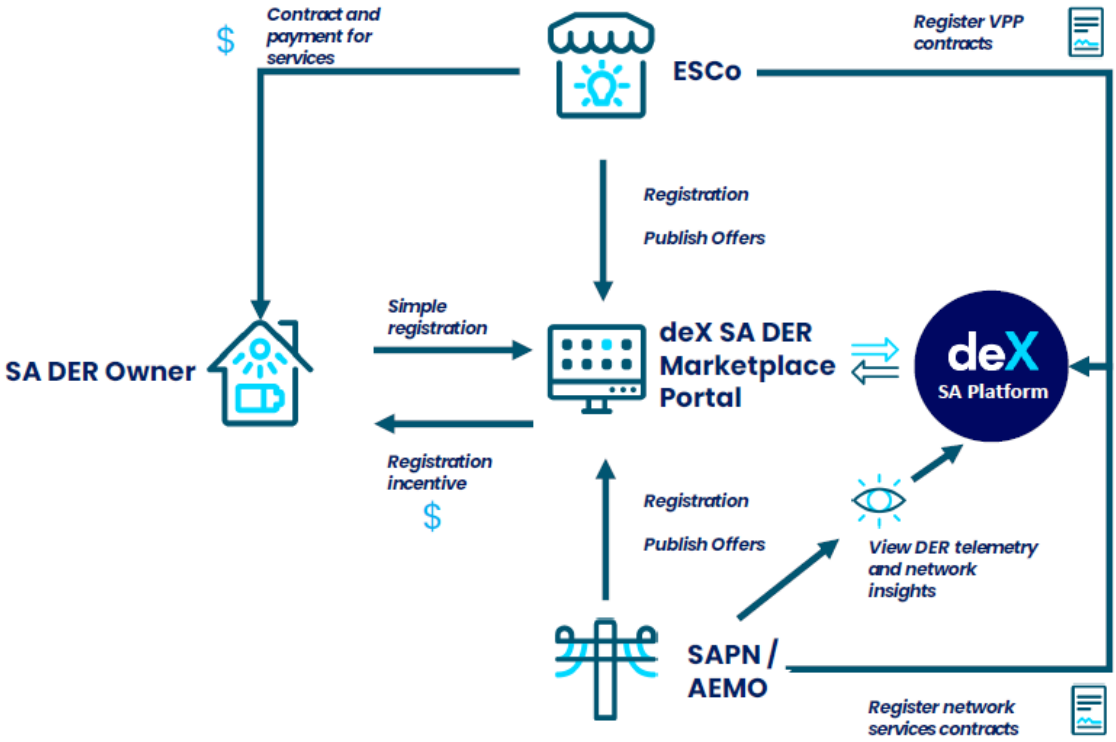
- Enabling AEMO and SAPN to procure grid services from CER and VPPs, giving consumers access to value streams previously unavailable, and reducing the cost of procuring market support services

The key outcome of the deX Project was a demonstration of the means to implement a digital marketplace via an online portal. That marketplace would enable South Australian consumers with CER to find and accept offers from energy service providers that value the services of their CER.

3.2. Scope and Approach

The deX Project proved the viability of an energy marketplace by incorporating a registration process for eligible CER devices which allowed the owners to access offers relevant to their CER assets. The marketplace gave ESCos the ability to access de-identified information about the type, location, and technical capability of registered CER, to publish new offers based on specific CER characteristics, and to contact consenting customers regarding promotional offers, as Figure 4 illustrates.

Figure 4 – The deX Project CER Marketplace Portal Schematic



Source: GreenSync (2019)

The deX Project market platform, which was built on the foundational deX coding, created a live, SA-specific capability for CER to be contracted by ESCos, and for ESCos to be contracted by SAPN / AEMO to provide grid services. It also enabled SAPN and the SA Government access to real-time visibility of registered CER to enable data-driven network planning, operations, and government policy development to provide grid services.

3.3. Roles and Responsibilities

The deX Project was conducted collaboratively among a diverse group of participants, each taking on specific roles and responsibilities crucial to its success. The participants served in various roles with accompanying responsibilities:

Project Lead

GreenSync, the deX Project leader, managed overall coordination and implementation. GreenSync developed and maintained the deX platform, a core technological component of the deX Project that

facilitated the registration of CER. GreenSync also managed and contracted partnerships for the marketplace platform.

Electricity Retailers and Energy Service Companies

The deX Project partnered with retailers who offered services to customers allowing them to participate and gain value in the market. Participating retailers and energy service companies, including Powershop, Simply Energy, Discover Energy, and Amber, hosted offers yielding a 'pull' factor for customers within the deX marketplace.

Technology Vendors

Technology vendors played a role in the deX Project through CER technology integration within the deX platform, enabling full integration of several services, as well as bundling of services. These services constituted another 'pull' factor that attracted customers.

Installers

Installers played a role in the wider deX Project in registration of CER devices, such as solar panels and batteries, directly at the point of installation using a developed Device Registration portal or the mobile app for the portal.

Electricity Networks

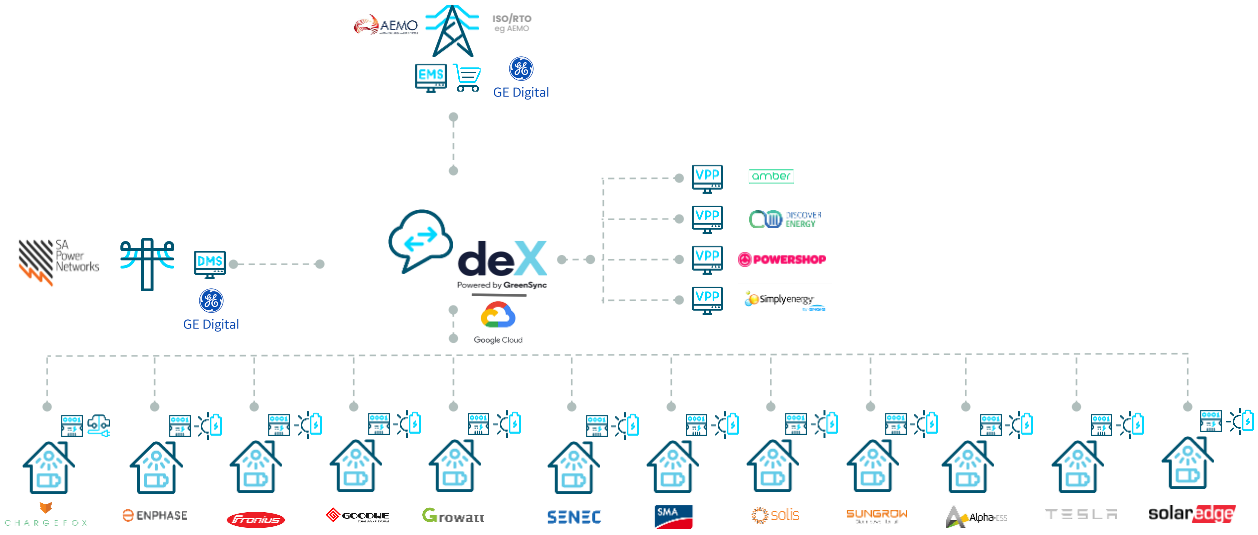
SA Power Networks (SAPN) were responsible for facilitating regulatory compliance and supporting the operational functionality of CER systems to enhance grid management and energy distribution.

Funding

The State Government of South Australia initiated and partially funded this project through the South Australia Demand Management Trials Program.

Figure 5 illustrates the framework of the deX Project that connected the various stakeholders.

Figure 5 – Project Participants



Source: GreenSync (2019)

3.4. Achievements

The key achievements of the deX Project are centred on the design, establishment, development, launch and operational success of a digital marketplace for CER. Those achievements collectively yield significant value to consumers as well as to the energy market, as Table 1 describes.

Table 1– Summary of deX Project Outcomes for Key SA Stakeholders

Stakeholder	Project Outcome
Customer	• Increased choice, avoiding service 'lock into deX though' • 'Virtual power plant (VPP) ready' to future-proof investment by customers in CER • Ability to receive incentives for grid services
Network Operators	• Increased visibility of CER connections • Streamlined CER network connection process • Support of DNSP reporting obligations for AEMO National CER Register
Retailers	• Reduced barriers to enrolling customers into a VPP • Reduced barriers to monetising VPP portfolio
Original Equipment Manufacturers	• Reduced barriers to accessing additional benefits using devices • Provided a platform for meeting jurisdictional requirements • Increased standardisation of jurisdictional technology requirements
Government	• Enabled 50,000-customer Home Battery Scheme program to be 'VPP ready' • Provided foundation for effectively managing CER integration • Unlocked grid and market service payments to consumers with CER

Source: GreenSync

A detailed list and description of the achievements of the deX Project is provided below:

- **Industry Engagement:** GreenSync conducted comprehensive consultations with 26 stakeholders, including electricity retailers, technology vendors, consumer advocacy bodies, and government entities. This engagement helped validate initial workflows and gather insights that informed the design of the deX SA portal and platform.
- **Portal and Platform Design:** The deX SA Portal was designed to ensure a user-friendly interface that facilitates easy registration and participation of CER owners. This included designing the landing page, registration pages, and interfaces for viewing available energy offers.
- **CER Technology Integration Roadmap:** GreenSync created a roadmap to outline the integration of various CER technologies, enhancing the portal's ability to support a wide range of devices and ensuring comprehensive market participation.
- **Customer Protections Plan:** GreenSync established a plan to manage the collection, storage, access, and use of customer data and CER information securely, addressing privacy and regulatory compliance.
- **Incentive Payments Model:** An incentive model was developed to encourage CER owners to register their devices on the deX platform, aiming to boost participation and enhance the value extracted from aggregate market participation.
- **Knowledge-Sharing Report 1:** Publication of a public knowledge-sharing report as part of the transparency and community engagement components of the project detailed the insights and outcomes of the industry engagement and co-design phase.
- **Market Platform Back-End Development:** Completion of foundational back-end development enabled the marketplace to operate in production, supports the digital contract formation between ESCos and consumers, and enables control and dispatch of registered devices.
- **Deployment and Launch of deX SA Portal:** Successful deployment of the portal gave South Australian residents a user-friendly interface to register their CER devices and explore ESCo offers to gain more value from their CER. The portal also included informational resources about the industry and project.
- **CER Registration and Contract Formation:** Both the portal and a complementary Device Registration App were developed and launched, streamlining the registration process and improving data quality. The app allowed installers to register CER on behalf of owners at the installation point.

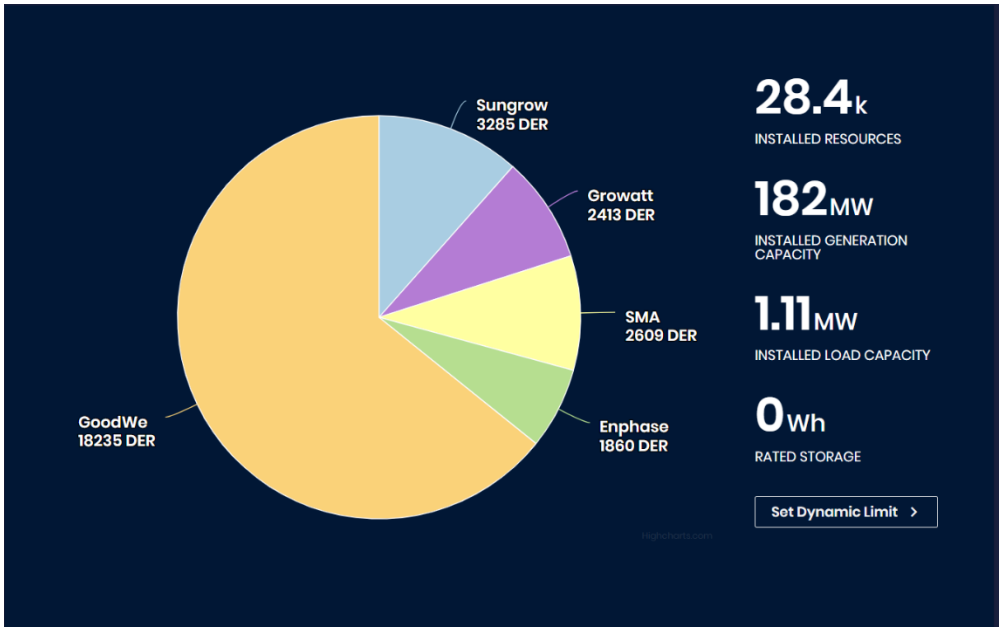
- **Integration With Key Technology Platforms:** Successful application programming interfaces (API) integrations with Solar Analytics, Sungrow, and Chargefox were completed, enhancing the deX Project's capacity to support a diverse range of CER technologies.
- **ESCo Offers and Participation:** Two ESCos – Discover Energy and Amber Electric – confirmed their participation, with Discover Energy's offers going live in the portal.
- **Industry Capacity Building and Training:** GreenSync conducted extensive training and capacity-building activities, including 15 sessions with 6 retailers and 25 sessions with 10 technology vendors, as well as training for numerous individual installers to ensure they were well-informed and equipped to use the deX SA Portal and Device Registration App.
- **Knowledge-Sharing Report 2**: Continued knowledge-sharing functions included publication of reports and ongoing updates to industry stakeholders, maintaining transparency and engagement throughout the deX Project's development.
- **Successful Implementation of Platform Functionality:** The deX Project established a robust platform that enables a variety of CER types from various OEMs to register and participate in Virtual Power Plant (VPP) offers.
- **High Adoption of the Device Registration App:** A dedicated app developed for device registration had strong appeal, with 1,544 devices registered through the app compared to 10 through the portal.
- **Integration with Energy Service Providers:** The deX Project triggered two VPP offers with energy service providers and prompted discussion of additional partnerships, illustrating demonstrable potential to increase CER participation.
- **Technology Integrations:** Successful certification and integration with major inverter brands, such as Growatt, SMA, and Goodwe, expanded the deX Project's reach and exhibited its capability to handle a diverse range of CER technologies.
- **Compliance With Regulations:** Adaptation of the deX Project to align with the newly introduced Smarter Homes Regulations ensured that the deX Project remained compliant while still delivering its intended benefits.
- **Customer and Industry Survey:** GreenSync conducted a project information session in Adelaide with customers and industry representatives to explain the end-to-end process and validate the viability of the deX platform.
- **Knowledge-Sharing Report 3:** A knowledge-sharing report distributed to industry stakeholders helped to maintain openness and promote widespread understanding of the deX Project's progress and benefits.
- **Milestone Reports:** Three comprehensive reports that were published documented progress and detailed the achievements of the deX Project during each milestone.

deX Platform Use by SAPN

To date, SAPN continues to use the GreenSync deX portal within its Smarter Home Relevant Agent program by registering additional CER devices as on behalf of several agreed technology providers.[15] Figure 6 provides a sample screenshot of registered CER devices for Smarter Homes Relevant Agent program via the SAPN GreenSync deX portal. It shows that as of April 2024 there are over 24,400 registered devices on SAPN's deX portal.

[15] SAPN Smarter Home Relevant Agent Program, https://www.sapowernetworks.com.au/industry/relevant-agent/

Figure 6 – Overview of SAPN Registered Assets via the GreenSync deX Portal



Source: Greensync

GreenSync has also engaged with ARENA and Intellihub in the Demand Flexibility Platform project. The Platform builds on the deX platform initially developed by GreenSync to support the registration of multiple device types in a retailer or network VPP.[16] As part of this project, SAPN now use the deX Common Smart Inverter Profile – Australia (CSIP-AUS) - this is the same deX platform as per Smarter Homes. The platform has currently integrated with two Solar PV OEMS (GoodWe and Solis), with these OEMS deemed to comply with SAPN's dynamic export requirements.[17] This is in addition to the existing Solar PV OEMS that are already enabled for emergency solar backstop on deX. GreenSync has a roadmap of CSIP-Aus integrations underway with other Solar PV OEMS aiming to complete throughout 2024

To verify how the deX platform helped stabilise the South Australian electricity grid, consider the events of 12 November 2022. Extreme weather toppled a transmission tower on the Heywood Interconnector near Tailem Bend, leading to the isolation of South Australia's power grid. In response, SAPN effectively utilised the deX platform to help stabilise the grid by controlling CER devices registered on the platform, thereby contributing energy exports to the grid. This decisive action, coupled with the cancellation of six other scheduled events in 2022 due to improved grid stability, underscored the critical role of the deX platform in effectively managing grid crises.

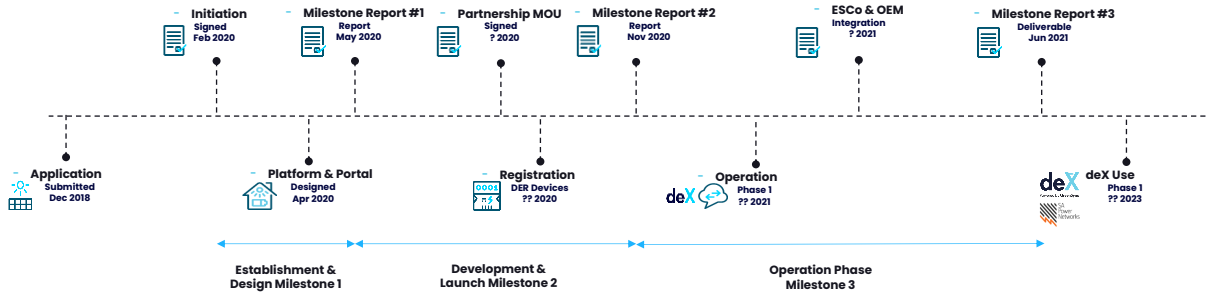
3.5. Timeline

A summary of the timeline of the deX Project is shown in Figure 7.

[16] Intelihub Australia Demand Flexibility Platform Milestone Report, 2024, https://arena.gov.au/projects/intellihub-demand-flexibility-platform-project/

[17] Intelihub Australia Demand Flexibility Platform Milestone Report, 2024, https://arena.gov.au/projects/intellihub-demand-flexibility-platform-project/

Figure 7 – deX Project Timeline



Source: Energeia, GreenSync

4. Key Lessons Learnt and Implications for the Future

This section of the report outlines the key lessons learnt throughout the design, establishment, development, launch, and operation of the deX platform in South Australia as part of the deX Project. It describes the obstacles encountered, how they were overcome, and the implications for policymakers, regulators, and industry stakeholders.

4.1. Refocus Incentives for Enrolment to Encourage OEM Vendor Participation Rather than Just Platform Registration

One of the deX Project's key aims was to establish an easy pathway for registering CER assets, simplifying the process for consumers to benefit. The deX Project did so by creating a straightforward digital pathway for all eligible solar and storage inverters that qualified for a rebate. This approach was intended to lower costs for both consumers and installers by improving accessibility and efficiency in integration of CER assets into the energy market.

As a part of the scope, the deX Project's establishment and design phase included implementing a registration incentives model that allocated funding to encourage the participation of CER asset owners, ensuring that incentives were passed directly to customers. This phase also anticipated the participation of some technology vendors that had expressed interest in exploring non-retailer aggregator business models with the potential for more to emerge over time through the exchange functions.

While stakeholders broadly supported the deX Project's intentions, particularly the capability for CER owners to engage more easily in market services via aggregators or VPP operators, the execution faced impediments. Although 12 technology vendors were consulted during the design and establishment phases, with expectations to integrate 80% of them during the operational phase, only three completed their integration with the deX SA API.

Key Lesson Learnt

A key lesson that emerged from these experiences emphasised a need to shift the focus of incentives toward encouraging OEM vendor participation — not just platform registration — to enhance the integration of technology vendors into the marketplace portal. This refocused approach would bridge the gap between the technological capabilities of vendors and the strategic objectives of the deX Project. This would ensure that the intended benefits of the deX Project could be realised more effectively.

GreenSync recognised that engagement with CER technology revealed a lack of widespread availability of certain capabilities, including device compatibility – a point also noted in other VPP project knowledge-sharing reports.[18,19] There was no expectation for these capabilities to develop within the short term to accomplish the operational phase objective. Also, technology vendors regarded the absence of a viable business case to develop these functions as a significant barrier.

[18] AEMO VPP KS Report 2, July 2020, https://aemo.com.au/-/media/files/electricity/der/2020/vpp-knowledge-sharing-stage-2.pdf

[19] ARENA Project Symphony VPP lesson learned, https://arena.gov.au/assets/2022/08/project-symphony-lessons-learnt-2.pdf

Insight and Implications

Policymakers should consider policies that foster deeper OEM engagement in VPP projects. Incentivising OEMs to connect and actively participate could lead to more robust and integrated VPP systems, thereby enhancing the overall effectiveness of renewable energy integration into the grid.

Regulators may need to adjust regulatory frameworks to encourage OEM vendor participation in the energy market. Accommodations could include revising standards and compliance requirements to facilitate more seamless integrations and operations of VPPs involving various OEM technologies. The regulatory changes for smarter homes in South Australia represented a step forward in revising technical standards to increase VPP participation.[20]

For the VPP operators, refocusing incentives on OEM participation rather than more registration could drive more dynamic and economically viable VPP ecosystems. This would encourage development of diverse and technologically-advanced VPP solutions that can better respond to market and grid demands.

4.2. Demand for Controllable Solar PV Was High, While Battery Registration Was Very Low

A key aim of the deX Project was to develop and demonstrate future marketplace functions to provide additional value to customers. This included enabling CER owners to engage in VPP and grid services opportunities, enhancing the business case for investing in renewables.

The implementation of the SA Government's Smarter Homes Regulations in September 2020 had notable effects on both the CER environment in South Australia, and the trajectory and prospects of the deX Project.[21] Specifically, the potential for and value of controllable solar PV within the deX Project have been substantially enhanced.

GreenSync registered numerous solar PV systems through vendors and relevant agent partners and expected this number to continue growing exponentially as further OEM integrations were completed. All these devices could leverage the capabilities of the deX Project, enabling additional increase value for the customer while ensuring provision of critical grid protection services.

On the other hand, involvement of battery storage devices had been constrained by adoption rates, which had not increased as rapidly as expected when the deX Project proposal was submitted.

During the design and establishment phase, stakeholders had raised concerns regarding the complexities of battery adoption for consumers. All stakeholders acknowledged that customers encountered inconsistencies and obstacles when purchasing battery or solar PV products. While stakeholders generally supported the Home Battery Scheme (HBS),[22] many recognised the challenges customers faced in navigating the program, along with dealing with product sellers, technology vendors, electricity retailers, metering providers, installers, and potentially network companies.

Furthermore, because of commercial decisions by key technology providers, some device types were rendered incompatible. This restriction significantly hindered registration of devices and development of VPP offers.

Key Lesson Learnt

This experience indicated that despite high demand for controllable solar PV, registration of batteries remained significantly low. This disparity affected retailer partners who struggled to extract

[20] South Australia Regulatory Change for Smarter Home, https://www.energymining.sa.gov.au/industry/modern-energy/solar-batteries-and-smarter-homes/regulatory-changes-for-smarter-homes/information-for-customers-and-owners

[21] South Australia Regulatory Change for Smarter Home, https://www.energymining.sa.gov.au/industry/modern-energy/solar-batteries-and-smarter-homes/regulatory-changes-for-smarter-homes/information-for-customers-and-owners

[22] South Australia Home Battery Scheme, https://www.energymining.sa.gov.au/consumers/solar-and-batteries/hbs-closure

commercial value that justified their investments in the deX Project without further subsidisation. Other VPP trials have demonstrated that registering a battery is complicated and typically involves coordination among multiple parties.[23]

On the other hand, the evidence of the high demand for controllable solar PV in the deX Project justifies the emergency backstop strategies in South Australia through which to manage interaction of these resources with the grid.[24] This is particularly relevant considering occasional unfavourable electricity wholesale market pricing fluctuations in South Australia, where effective management of solar output can mitigate potential economic and operational shortcomings.

Insight and Implications

Policymakers and regulators should consider the impact of SA Smarter Homes and other regulations on CER adoption. While these regulations have bolstered solar PV integration, they also have inadvertently affected the uptake of battery systems, illustrated by discontinuation of South Australia subsidy allocations resulting from termination of its Home Battery Scheme (HBS).[25] Insufficient support for battery registration suggests a need for balanced regulatory measures that support all types of CER. Furthermore, incentives or support mechanisms specifically aimed at enhancing battery storage adoption may be necessary to ensure a more balanced energy storage ecosystem.

The VPP industry can leverage the high adoption of controllable solar PV to enhance grid stability and energy distribution. The VPP industry must also navigate the challenges of integrating currently less popular technologies like battery storage, forecast by AEMO to ramp up in adoption over the short-term horizon.[26] The industry should work closely with technology providers and regulators to resolve the barriers to battery registration and participation in VPPs, especially considering the technological and regulatory requirements that the deX Project illuminated. Other works on VPPs have revealed the hurdles for battery registration, which typically involves coordination among multiple parties.[27]

4.3. Installers Preferred Mobile Apps to Online Portals

The deX Project focused on simplifying the registration process for CER assets to enhance consumer benefits. This included creating a straightforward digital pathway specifically designed for eligible solar and storage inverters, ultimately reducing costs for consumers and installers.

The key element to accomplishing this objective was the launch of a registration portal. This online platform guided installers through the process of registering their CER devices digitally. Users could also access offers from ESCOs to maximise the value of their CER.

However, throughout the establishment and design phase of the deX Project, stakeholders consistently stressed the importance of having a streamlined, automated, and accurate CER registration process that could be carried out in the field during installation. In response, GreenSync created a Device Registration App to supplement the Portal registration pathway.

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[23] Simple Energy VPP Lesson Learned, 2022, https://arena.gov.au/assets/2022/12/simply-energy-vppx-lessons-learnt-2.pdf

[24] Effective integration of distributed energy resources (DER) and flexible demand, https://www.energy.gov.au/sites/default/files/2021-10/Effective%20integration%20of%20distributed%20energy%20resources.pdf

[25] South Australia Home Battery Scheme (HBS), https://www.energymining.sa.gov.au/consumers/solar-and-batteries/hbs-closure

[26] AEMO IASR (2023), https://aemo.com.au/en/consultations/current-and-closed-consultations/2023-inputs-assumptions-and-scenarios-consultation

[27] Simple Energy VPP Lesson Learned, 2022, https://arena.gov.au/assets/2022/12/simply-energy-vppx-lessons-learnt-2.pdf

Subsequently, during the operational phase, GreenSync personnel unexpectedly observed that the deX SA Portal had limited utilisation, with only 10 devices registered. By contrast, the Device Registration App experienced a remarkably high adoption rate of 1,544 devices.

Key Lesson Learnt

This finding that adoption of the App had far exceeded expectations and substantially outperformed the volume of Portal registrations confirmed that CER installers prefer the accessibility of mobile apps over the higher functionality of online portals. An examination of other VPP aggregators, including Origin Energy, AGL, and Amber Electric VPP platforms, indicated that the predominant method for CER device registration and communication with installers is through user-friendly apps.

Insight and Implications

Policymakers should consider supporting and promoting development of device registration mobile applications, which installers favour for their convenience and ease of use. Such support could include funding for development, thereby ensuring alignment of regulatory requirements with mobile app functionalities.

VPP operators should prioritise creating a simple user experience for participants[28] that extends to the consumer-facing aspect of VPPs. Consumers benefit from apps that simplify the registration and management of CERs, making participation in VPPs more accessible. Educating consumers and installers about the availability and advantages of such apps can enhance their experience and satisfaction with CER technologies.

4.4. Installers Needed to Be Educated on Emerging Compliance Requirements as Well as VPP Opportunities for Customers

One of the objectives of the deX Project was to help certified installers digitally register CER during installation. This was done to help ensure the collection of high-quality data for the market platform from installation day.

Accordingly, the deX Project dedicated considerable time and effort to educate and train installers on using the deX SA Portal and Device Registration App. The deX Project also provided general information about CER and VPPs. However, during the operational stage, GreenSync observed that awareness of new compliance requirements and VPP opportunities varied greatly among installers. While some installers were adaptable to the regulations, others remained largely uninformed. To bridge this knowledge gap, GreenSync developed straightforward, highly effective support materials.

Key Lesson Learnt

This experience highlighted the necessity of educating installers about emerging compliance standards and the opportunities available for customers through VPPs. Although the South Australian Smart Home regulations created a distinct factsheet for installers outlining the new requirements,[29] CER installers needed clearer guidance on emerging compliance and technical standards for installation of VPP-enabled devices.

Insight and Implications

Policymakers should focus on developing and disseminating clear, accessible information and training resources to help installers stay connected with rapidly evolving technologies and regulatory landscapes. This could involve collaborations with industry bodies to standardise training, as well as certification processes that include new regulatory and technological updates. Aligned with this

[28] AEMO VPP Knowledge sharing 3, https://aemo.com.au/-/media/files/initiatives/der/2021/vpp-demonstrations-knowledge-sharing-report-3.pdf

[29] South Australia Regulatory Change for Smarter Home, https://www.energymining.sa.gov.au/industry/modern-energy/solar-batteries-and-smarter-homes/regulatory-changes-for-smarter-homes/information-for-customers-and-owners

insight and implication, the current CER technical standards recently reviewed by AEMC recommend funding training on these standards for installers.[30]

Because installers are fundamentally important for informing customers of the existence and benefits of VPPs, they must actively seek and participate in ongoing education and training initiatives to keep pace with changes in the industry. Engaging with networks, OEMs, and technology providers like GreenSync can furnish the tools and knowledge they need to support customer registrations and compliance effectively.

4.5. Technical Procedures to Participate in the Marketplace Were Complex and Took Longer to Implement than OEMs Anticipated

The deX Project sought to improve network and system visibility of customer CER assets for SAPN, to help ensure grid stability. This was done by offering SAPN access to real-time data of registered CER devices.

To achieve this, one of the fundamental outcomes of this project was the creation of a CER register that allows visibility of these devices to the network and system operator, incorporating technical integrations with OEMs to enable direct access to OEM platforms.

GreenSync developed several technology integrations throughout the deX Project, including accommodations for:

- Solar PV Inverters,
- Battery Inverters,
- Hybrid Inverters,
- Batteries,
- EV Chargers, and
- Gateway Devices.

GreenSync completed three integrations in 2020 with Sungrow, Chargefox, and Solar Analytics, and three further integrations in 2021 with Growatt, SMA Solar Technology, and GoodWe. Four additional integrations reached the 'qualified' stage, and two others the 'scoping' phase.

To ensure the necessary refinements could be supported, the deX Core first needed to be reinforced. In particular, the work included upgrading the deX Core database and enhancing the registration flow for all the OEM bridges. These improvements were required to ensure deX remained stable, secure and capable of accommodating the increasing scale of DER being registered on the platform. It was additionally necessary as it helped to support the increasingly complex registration processes associated with multiple OEMs.

Key Lesson Learnt

A key lesson learnt from the deX Project was that the technical functions enabling the various CER devices on the platform took longer than expected to implement due to their complexity and diversity.

GreenSync noted additional complexities that likely contributed to delays in implementation. Some OEMs did not meet the compliance requirements for integration. In some instances, solutions and workarounds were developed to ensure completion of the integration. In other cases, some OEMs failed to release their API within the allotted time.

Insight and Implications

[30] AEMC Review and Recommendation on CER Technical Standards, Sep 2023, https://www.aemc.gov.au/sites/default/files/2023-09/RCERTS%20Final%20Report.pdf

The VPP industry must manage expectations of key stakeholders around the speed and ease of integrating diverse OEM technologies. It may also need to invest in developing more robust technical support structures for OEMs to facilitate these integrations. Collaborative efforts between VPP operators and OEMs could be essential to overcome technical barriers and ensure effective participation.

GreenSync notes that OEMs expressed their keenness for the implementation solutions from this project to be transferrable to other jurisdictions to ensure long-term viability. This outcome results from the noted workarounds that were implemented in some cases.

4.6. Wi-Fi Based Participation for System Owners Can Be Subject to Difficulties

A key aim of the deX Project was to enable real-time access to CER device load data for VPP load aggregators and SAPN. The deX platform supported real-time data transmission and management through its API, allowing VPP operators and SAPN to access current data on energy production, consumption, and storage from registered CERs.

Registered CER devices, such as solar inverters and battery storage systems, utilised the device owner's Wi-Fi to connect to the internet. Once enabled, CER devices used this Wi-Fi to send real-time operational data to the deX platform. The platform relied on the availability of this connection to access the load data.

Key Lesson Learnt

Two key limitations arose from this implemented process. First, Wi-Fi-based connectivity was subject to local outages and manual disconnections. Unavoidable circumstances included turnover of rental tenants, requiring action to reconnect residences to an OEM platform. Additionally, not all homes have a Wi-Fi internet connection, requiring alternative solutions, such as a 4G 'dongle.' Some OEMs in the industry have moved to ethernet or cellular, which can be more reliable.

Other related projects have experienced similar outcomes. AEMO's VPP trials encountered difficulty in maintaining connections through a house-to-VPP cloud system, with communication dropouts resulting in AEMO receiving only 70–98% of data from each participant.[31] The ESB Report on the Functional Gap Analysis of CERs[32] additionally highlighted issues with communication pathways reliant on the internet, including cyber security.

Insight and Implications

Policymakers should consider strategies to support more robust and reliable connection solutions beyond Wi-Fi, such as dedicated communication channels or enhancements in device connectivity that do not solely depend on homeowner-managed networks. Policies could also encourage or mandate technologies that ensure a more consistent online status for CERs to be enrolled in a VPP.

VPP operators must overcome potential variability in CER connectivity and explore solutions that minimise reliance on homeowner-controlled internet connections, incorporating more resilient communication technologies or developing fallback strategies when Wi-Fi connectivity fails.

CER OEMs should consider designing and developing products that can operate effectively under various connectivity scenarios, including less reliance on Wi-Fi. This might involve integrating multiple communication options such as Wi-Fi, cellular, and possibly LPWAN (low power wide area network) technologies to ensure reliable, uninterrupted service. OEMs also could benefit from collaborating closely with VPP operators to understand connectivity requirements and develop devices adaptable to various home and commercial environments.

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[31] AEMO NEM Virtual Power Plant Demonstrations, September 2021, https://aemo.com.au/-/media/files/initiatives/der/2021/vpp-demonstrations-knowledge-sharing-report-4.pdf?la=en

[32] ESB CER Report, Functional Gap Analysis, 2023, https://www.energy.gov.au/sites/default/files/2024-02/ESB%20report%20-%20CONSUMER%20ENERGY%20RESOURCES%20AND%20THE%20TRANSFORMATION%20OF%20THE%20NEM.pdf

Appendix A: Summary of Current Initiatives

Table A1– Summary of Recent or Upcoming Policy/Regulatory from Authorities to Unlock CER

Initiative	Description	Objectives of Initiative	Barriers Aiming to Address	Source
Flexible Trading	Proposed rule change to implement an opt-in model and metering arrangement for trading flexible CER in the market	• Enable opt-in separation of flexible CER from inflexible load, allowing them to be individually managed and settled in the wholesale electricity market • Unlock more CER value in the market	• Current rules and metering arrangements make accessing total system benefits of CER difficult	AEMC, 2023 https://www.aemc.gov.au/rule-changes/unlocking-CER-benefits-through-flexible-trading
Metering Review	Review of the current metering framework and efficacy of previous reform with proposed reform agenda	• Quicken smart meter rollout • Assist customers transitioning to smart meters • Enhance smart meter installation process • Access greater benefits from smart meter data and services	• Value of smart meters is not being maximised as rollout is too slow, incentives are misaligned, processes are inefficient, customer experiences are poor and data accessibility is lacking	AEMC, 2023 https://www.aemc.gov.au/sites/default/files/2023-08/emo0040_-_metering_review_-_final_report.pdf
Integrating Price-Responsive Resources	Proposed rule change for introducing a "scheduled lite" mechanism for integrating currently unscheduled price-responsive resources into the market scheduling process	• Implement a two-mode approach for integrating price-responsive resources where they provide indicative bids (visibility mode) initially and later provide scheduled bids (dispatch mode) to AEMO • Give AEMO greater visibility of resources for better forecasting and planning	• Variability and low visibility of currently unscheduled price-responsive resources can impact security and reliability of the grid	AEMC, 2023 https://www.aemc.gov.au/sites/default/files/2023-08/ERC0352%20-%20Integrating%20price-responsive%20resources%20into%20the%20NEM%20-%20Consultation%20paper.pdf
EV Charging Data	Proposed rule change to include and collect EV 'standing data' in the CER Register	• Expand the CER Register to include data on the location and characteristics of electric vehicle supply equipment • Provide AEMO and DNSPs with the data required for improved	• EV charging demand experiencing rapid growth and currently no way to collect standing data through the CER Register	AEMO, 2023 https://www.aemc.gov.au/sites/default/files/202312/Submission%20AEMO%20to%20AEMC%20-%20EVSE%20rule%20change%20-%2012%20December%202023.pdf

		planning and forecasting of EV charging		
CER Technical Standards	Review of the introduced CER technical standards with recommendations for development of new standards	• Increase the compliance of CER with current and future technical standards • Reform governing structures for developing and introducing technical standards	• Significant lack of compliance in recently installed CER devices	AEMC, 2023 https://www.aemc.gov.au/sites/default/files/2023-09/RCERTS%20Final%20Report.pdf
Billing Transparency	Consultation on current billing data systems and uses with recommendations	• Find ways to improve the transparency of electric billing data, including establishing needs, data required, and options for collection • Create a better understanding of factors influencing consumer behaviour and bills, so that stakeholders can improve outcomes	• Limitations in current data collection, including gaps in useful information and inaccessibility of datasets to stakeholders that need them	ESB, 2023 https://www.aemc.gov.au/sites/default/files/2023-08/esb-billing-transparency-consultation-paper-final-july-2023.pdf
Review of Consumer Protections	Review of the suitability of the current consumer protection framework	• Assessment of ways to manage consumer risks and better optimise electricity consumption and generation • Ensure the protection framework instils trust and confidence in consumers during transition to new energy services	• Reliance on current protections considered inappropriate, leaving consumers at risk • Risks involve contracts, information provision, performance of services, control of assets, payment difficulty, dispute resolution, and service provider conduct	AER, 2023 https://www.aer.gov.au/system/files/2023-12/AER%20%20Review%20of%20consumer%20protections%20for%20future%20energy%20services%20-%20Final%20advice%20-%20November%202023.pdf
Network Visibility	Consultation on LV network visibility	• Identify the datasets required and the ways to distribute them to Increase LV network visibility in the market to better inform the stakeholder making decisions	• Rapid CER growth with lack of visibility and control is making managing the LV network difficult • No current requirements to provide LV network data and lack	ESB, 2023 https://www.aer.gov.au/system/files/ESB%20-%20Network%20Visibility%20-%20July%202023.pdf

		about planning and managing CER, improving outcomes	of consensus on what data is most useful	
Solar Backstop Mechanism	Introduction of mandatory systems allowing AEMO to cut-off solar PV exports	• Enable AEMO to directly limit solar PV exports at times of emergency surplus as a final resort option	• Excess PV during times of low system load can lead to system issues like blackouts	GSES, 2020 https://www.gses.com.au/south-australian-regulations-for-new-solar-power-systems/ QLD Gov, 2024 https://www.energyandclimate.qld.gov.au/about/initiatives/emergency-backstop-mechanism
Flexible Export Limits / Dynamic Operating Envelopes	Proposed rule change to implement flexible export limits	• Develop materials and framework to establish flexible export limits in distribution networks • Allow consumer PV exports to be dynamically limited, maximising exports and their benefits	• Static export limits are set conservatively to alleviate infrequent times of system strain but continually limit PV exports even at times where it is not beneficial • Increasing CER penetrations are lowering static export limits further	AER, 2023 https://www.aer.gov.au/system/files/Flexible%20Export%20limits%20Final%20Response%20-%20July%202023_1.pdf

Table A2– Summary of DNSP Current Demand Management Program

DNSP	Program Objective	Program Technologies	Enrolment	Year Established	Source
SAPN	• Optimise a range of controllable loads in the home, along with other distributed energy resources such as battery storage	• Hot Water • Pool pump • Air conditioning	• 2,400 residential hot water systems • 200 air conditioning • 200 pool pump	2019	https://www.sapowernetworks.com.au/future-energy/projects-and-trials/smart-hot-water-control/
	• New approach to integrating rooftop solar with the grid, using smart inverters • Develop the associated technologies and customer connection service to the point where it could be offered as a standard service to all customers installing solar.	• Rooftop solar	• 600 residential	2020	https://www.sapowernetworks.com.au/future-energy/projects-and-trials/smart-hot-water-control/
	• Delivering greater value for operators and customers from CER • Provide up to 500 MW capacity by the largest VPP in the word	• Rooftop solar • Home battery	• 3,000 household to date	2020	https://www.sapowernetworks.com.au/data/308666/trial-aims-to-help-support-more-solar/
Energex	• Find Solutions for Network Challenges from CER • Better CER integration in the future for property development	• Solar PV • Battery • Hot water • Living space air conditioning	• 196 terrace homes with 100% Solar PV and Battery	2020	https://www.energex.com.au/__data/assets/pdf_file/0005/1096475/Demand-Management-Innovation-Allowance-annual-report-2021-22.pdf

Jemena	• Improve the energy literacy of demand response customers • Generate insights to inform future demand response programs	• Air conditioning	• 96 Customers Register • 4 DR Events	2019	https://www.aer.gov.au/system/files/Jemena%20-%20Demand%20Management%20Innovation%20Allowance%20-%20Annual%20Report%202020%20-%20April%202021.pdf
AusGrid	• Shifting appliance or equipment use from peak to non-peak periods • Understanding the value to consumers from Retailer demand response programs • Understanding effectiveness of various technology options, incentives and acquisition strategies	• Hot water • Air conditioner	• 2398 customers of Energy Australia • 845 customers of AGL	2021	https://cdn.ausgrid.com.au/-/media/Documents/Demand-Mgmt/DMIA-research/Demand-Response-Trial-Interim-Report-2023.pdf?rev=82f6967b5796431c94d590e7135b61b5
Endeavour Energy	• Shifting equipment use from peak periods to off-peak periods • The efficient operation lighting and appliances • Lower power bills for customers	• Hot water • Air conditioning • Pool	• Residential Customer	2021 for CoolSaver Program	https://www.endeavourenergy.com.au/modern-grid/creating-the-modern-grid/network-planning/demand-management